

CLAIMS:

1. A volume adjustable pipette, comprising:

a housing;

5 and from a stop during aspiration of a fluid into and dispensing of the fluid from a tip extending from the housing;

an axially moveable volume setting member in the housing defining the stop for the plunger and a volume setting for the pipette;

10 volume adjusting means for axially moving the volume setting member in response to a turning of a volume adjusting member; and

15 fine and coarse volume setting means respectively responsive to relatively large and small turnings of the volume adjusting member for sequentially moving the volume setting member relatively small and large axial distances, respectfully.

20 2. The pipette of claim 1 further comprising means coupling the coarse and fine volume setting means for sequential operation.

25 3. The pipette of claim 2 wherein one of the coarse or fine volume setting means is characterized by a force threshold for movement of the volume setting member by the one

of the coarse or fine volume setting means which is exceeded by a predetermined movement of the other of the coarse or fine volume setting means by the volume adjusting member.

5           4. The pipette of claim 1 further including means for monitoring the position of the plunger within the housing.

10           5. The pipette of claim 1 further including means for monitoring the position of the volume setting member within the housing.

15           6. The pipette of claim 1 further comprising:

means supporting the volume setting member for axial movement within the housing in response to a turning of the volume adjusting member wherein the means supporting the volume setting member for axial movement is responsive to a sequential turning of the volume adjusting member to produce a fine adjustment and a coarse adjustment of the volume setting for the pipette.

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7. The pipette of claim 6 wherein:

the coarse volume setting means includes a relatively coarse thread on an axially extending screw carried by the volume setting member; and

the fine volume setting means comprises a relatively fine thread on a sleeve comprising the volume adjusting member and which engages a relatively fine thread on the screw.

5       8. The pipette of claim 7 further comprising:

a fine adjustment limiter on a one of the volume adjusting member or screw; and

10       a shoulder on another of the volume adjusting member or screw for engaging the limiter whereby a turning of the volume adjustment member with the limiter against the shoulder produces a turning of the screw with the volume adjusting member.

9. The pipette of claim 6 further comprising:

15       a gear mechanism between the volume adjusting member and the volume setting member and responsive to a turning of the volume adjusting member to selectively produce a relatively small axial movement of the volume setting member through the fine volume setting means and a relatively large axial movement of the volume setting member through the coarse volume setting means.

20       10. The pipette of claim 9 wherein:

25       the volume setting member comprises an axially extending screw having a relatively coarse thread; and

the gear mechanism comprises a planetary gear mechanism including

a planetary gear carrier on the screw comprising the volume setting member,

5 a plurality of circumferentially spaced planetary gears on the carrier separately mating with an outer ring gear and

an inner sun gear carried by the volume adjusting member mating with the plurality of planetary gears to produce a turning of the sun gear, planetary gears and volume setting 10 member in response to a turning of the volume adjusting member to adjust the volume setting of the pipette.

11. The pipette of claim 10 wherein one of the coarse or fine volume setting means is characterized by a force 15 threshold for movement of the volume setting member by the one of the coarse or fine volume setting means which is exceeded by a predetermined movement of the other of the coarse or fine volume setting means by the volume adjusting member.

20 12. The pipette of claim 11 further comprising:

a fine adjustment limiter on a one of the volume adjusting member or ring gear; and

25 a shoulder, on another of the volume adjusting member or ring gear for engaging the limiter whereby a turning of the volume adjustment member with the limiter against the shoulder

produces a turning of the ring gear with the planetary gears and carrier to turn the volume setting member thereby adjusting the volume setting for the pipette.

5           13. The pipette of claim 12 further comprising a counter wheel for turning with the volume setting member to indicate the volume setting of the pipette.

10           14. The pipette of claim 9 wherein:

the coarse volume setting means includes a thread on an axially extending screw comprising the volume setting member; and

the gear mechanism comprises a planetary gear mechanism including

15           a planetary gear carrier on the volume adjusting member comprising the volume setting member,

              a plurality of circumferentially spaced planetary gears on the carrier separately mating with an outer ring gear coupled to the carrier and

20           an inner sun gear carried by the volume setting member mating with the plurality of planetary gears to produce a turning of the sun gear, planetary gears and volume setting member in response to a turning of the volume adjusting member to adjust the volume setting of the pipette.

15. The pipette of claim 14 wherein one of the coarse or fine volume setting means is characterized by a force threshold for movement of the volume setting member by the one of the coarse or fine volume setting means which is exceeded  
5 by a predetermined movement of the other of the coarse or fine volume setting means by the volume adjusting member.

16. The pipette of claim 15 further comprising:  
10 a fine adjustment limiter on one of the housing or ring gear; and

15 a shoulder on another of the housing or ring gear for engaging the limiter whereby a turning of the volume adjustment member with the limiter against the shoulder produces a turning of the ring gear with the planetary gears and carrier to turn the volume setting member thereby  
adjusting the volume setting for the pipette.

17. The pipette of claim 16 further comprising counter  
20 wheel means for turning with the volume setting member to indicate the volume setting of the pipette.

18. The pipette of claim 3 further comprising means supporting the volume setting member for axial movement within the housing in response to a sequential turning of the volume  
25 adjusting member independent of and with the volume setting

member to respectively produce a fine adjustment and a coarse adjustment of the volume setting for the pipette.

19. The pipette of claim 18 wherein:

5 the coarse volume setting means includes a relatively coarse thread on an axially extending screw on the volume setting member; and

10 the fine volume setting means comprises a relatively fine thread on a sleeve comprising the volume adjusting member and which engages a relatively fine thread on the volume setting member.

20. The pipette of claim 19 further comprising:

15 a fine adjustment limiter on a one of the volume adjusting member or volume setting member; and

20 a shoulder on another of the volume adjusting member or volume setting member for engaging the limiter whereby a turning of the volume adjustment member with the limiter against the shoulder produces a turning of the volume setting member with the volume adjusting member.